Astoria Conflagration

Astoria, Oregon
December 8, 1922

Estimated property loss $10,000,000. Estimated insurance loss $2,500,000.

BY THE

Oregon Insurance Rating Bureau

Portland, Oregon

THE ASTORIA CONFLAGRATION

INTRODUCTION

The most disastrous fire in the history of the State occurred at Astoria, Oregon, on the morning of December 8, 1922. Twenty-four city blocks in the heart of the business district were entirely destroyed and heavy losses were sustained in many of the adjoining blocks. To attempt a definition of the total loss in terms of dollars and cents is beyond the province of this report and moreover, any such figure must necessarily be a rough approximation since many of the owners are not able to fix their losses accurately. Suffice it therefore to say that practically every store, hotel and office building in the principal mercantile section of this city of fifteen thousand inhabitants was wiped out by the fire and hundreds of persons were bereft of all their belongings. Coming as it did in the wake of the Hammond Lumber Co. fire reported by this office on October 2, 1922, the present disaster has left Astoria in a critical condition. Many of the business men feel the loss much more acutely since their Christmas stocks had just been received and they are deprived of the anticipated holiday trade. In most cases the percentage of insurance to value was unusually low, estimated not to exceed 30 per cent. The actual physical suffering of the populace has been slight, however, since relatively few residences were destroyed and prompt relief measures were undertaken by neighboring cities. Had the timely warnings of fire prevention experts been heeded, it is probable that the present catastrophe would have been avoided. A brief review of local conditions will make this point clear and lead to a better understanding of the fire.

LOCAL CONDITIONS

Townsite

The historic little city, one of the oldest in the northwest, owes its growth and prosperity to its strategic position at the mouth of the Columbia River. The location, poorly endowed by nature as a townsite, consisted of a tidewashed mud flat, situated at the base of a steep brush covered hill of clay and shale rock formation. The character of this site caused the principal business portion of the city to be constructed on piling over the tide flat, the hillside being utilized only for residences and a few public buildings.

In 1917 an improvement campaign was inaugurated which resulted in the construction of a seawall, covering the enclosed area with sand dredged from the river, and reconstruction of the city streets upon a higher grade so as to allow ample basement room under the buildings. The new street grade was designed to be constructed upon a sand fill between concrete retaining walls; but on account of the expense involved, this plan was not fully carried out. For some of the principal streets a cheaper construction was provided by laying asphalt on a timber deck supported by girders and posts with footings on sawed-off piling. This construction which contributed largely to the disastrous proportions of the fire, may be readily understood from the accompanying cross section diagram. On the map incorporated with this report, these wooden streets have been shaded to distinguish them from the filled or solid streets. The latter are still practically as serviceable as ever but the former are entirely destroyed.

Building Construction

Because the wood piling foundation in general use was poorly adapted to permanent construction and on account of the abundance of lumber, Astoria has always tended toward the almost universal use of wooden buildings. The fire hazard created by this light construction with an intercommunicating system of frame galleries below some of the principal streets, was early recognized by this Bureau, who were instrumental in having an ordinance presented to the city council requiring property owners to install adequate fire stops. Again the plan was frustrated by the taxpayers who objected to the expense, and the city remained a potential conflagration district.

FIRE DEPARTMENT AND EQUIPMENT

The Fire Chief reported that on the morning of the fire all apparatus was in service and all men on duty. Three men regularly on leave each day had returned to the stations before the alarm came in. The crew comprised twelve regulars and ten call men. Distribution of men and apparatus among the four stations was practically as follows:

Hose Station No. 1 at 4th and Astor Streets

American La France automobile combination 40-gallon chemical engine and hose truck with 1200 feet of hose. Crew of two regulars and four call men.

Hose Station No. 2 at Melbourne and Taylor Streets

American La France automobile combination double 35-gallon chemical engine and hose truck with 1000 feet of hose. Crew of three regulars and one call man.

Hose Station No. 3 at 45th and Bond Streets

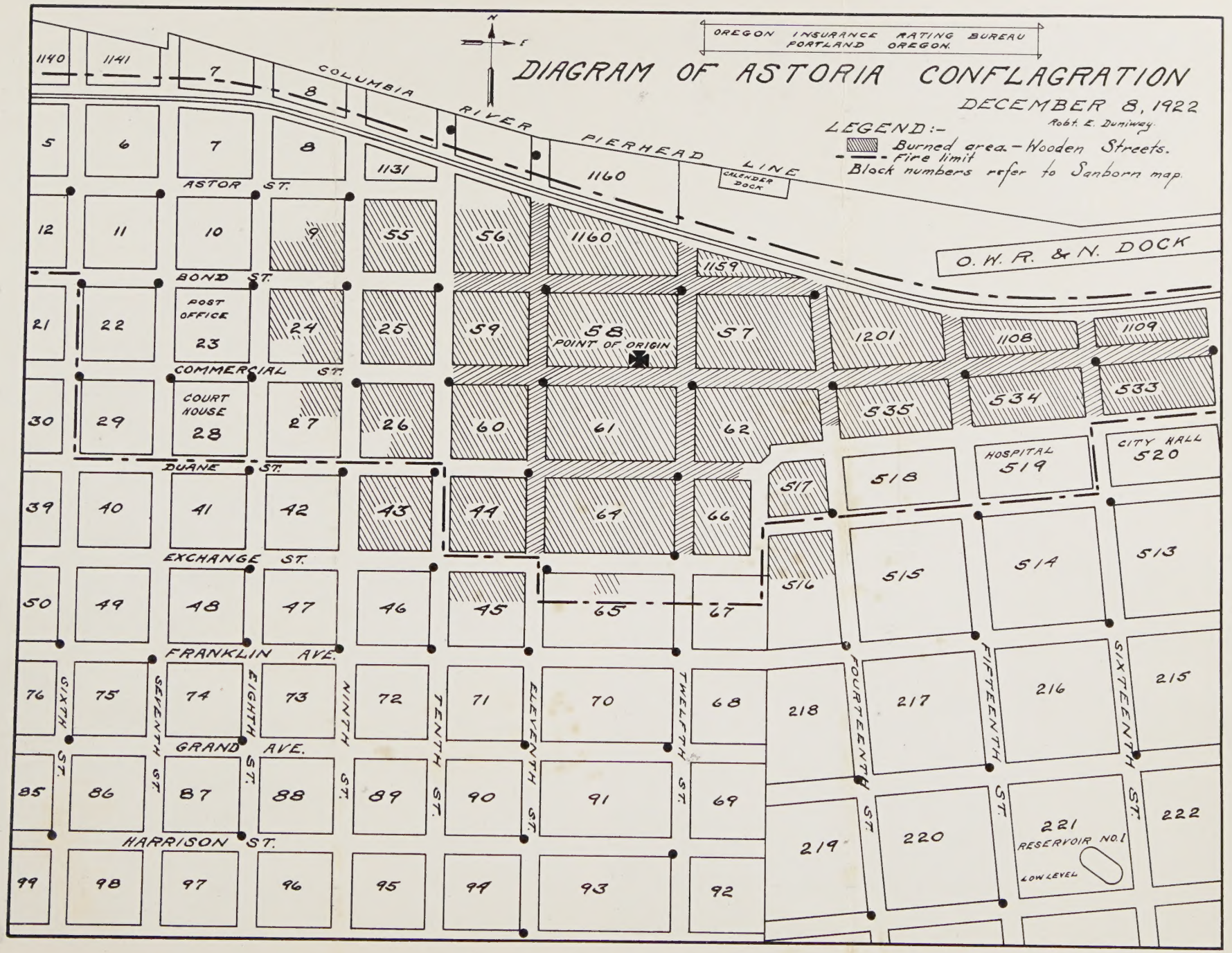
American La France combination single 60-gallon chemical engine and hose truck on a Locomobile chassis with 800 feet of hose. Crew of two regulars.

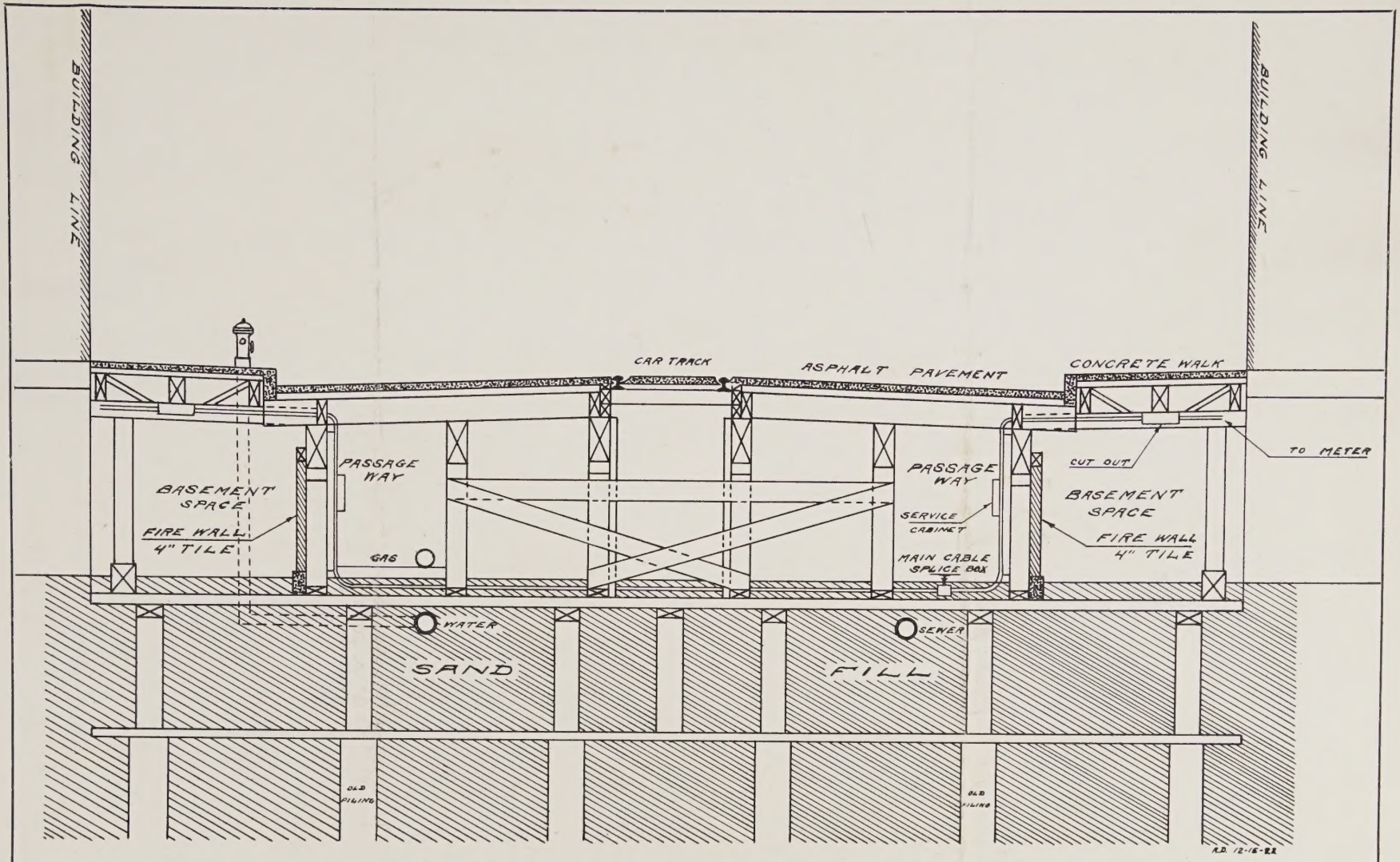
Engine Station No. 1 at 17th and Commercial Streets

Stutz triple combination 1000-gallon pumper, 40-gallon chemical engine and hose truck with 1200 feet of hose. Dodge truck with 800 feet of hose. Crew of five regulars and five call men. Fifty-five-foot extension ladder on truck arranged to be towed. (In reserve.) Double 60-gallon chemical engine arranged to be towed. (In reserve.)

The hose above mentioned together with hose in reserve on hand carts makes a total of 5000 feet checked up since the fire. The Fire Chief estimates that 3000 feet additional hose, formerly distributed at the stations, was lost during the conflagration.

CITY BEFORE CONFLAGRATION


OREGON INSURANCE RATING BUREAU
PORTLAND OREGON.
DIAGRAM OF ASTORIA CONFLAGRATION
DECEMBER 8, 1922
Robt. E. Duniway
LEGEND:-
Burned area - Wooden Streets.
Fire limit
Block numbers refer to Sanborn map.
N
COLUMBIA RIVER
PIERHEAD LINE
CALENDER DOCK
O. W. R. & N. DOCK
ASTOR ST.
BOND ST.
COMMERCIAL ST.
DUANE ST.
EXCHANGE ST.
FRANKLIN AVE.
GRAND AVE.
HARRISON ST.
POST OFFICE
COURT HOUSE
POINT OF ORIGIN
HOSPITAL
CITY HALL
SIXTH ST.
SEVENTH ST.
EIGHTH ST.
NINTH ST.
TENTH ST.
ELEVENTH ST.
THIRTEENTH ST.
FOURTEENTH ST.
FIFTEENTH ST.
SIXTEENTH ST.
RESERVOIR NO. 1
LOW LEVEL



CROSS SECTION OF ASTORIA VIADUCT STREET STRUCTURE

THE WATER SYSTEM

Distribution Sections

Since Astoria is located upon a hillside, it is necessary to maintain a three level system in order to give satisfactory service throughout the city. The commercial district north of Franklin Street, from 3rd to 17th Streets, comprises the low service section; the middle service section is principally situated to the north of Jerome Street from 8th to 17th Streets with long line extending to districts at similar elevation on the east and west, while the upper residential district utilizing the high service extends along the hillside on the southern side of the town from 1st to 53rd Streets. The gridiron in each of these sections consists principally of 6, 8 and 10-inch mains fairly well tied together and controlled by gate valves.

Storage Reservoirs

The lower service is supplied from a 500,000-gallon reservoir situated at 16th and Irving Streets 168 feet above city datum; the middle service is supplied from a 6,250,000-gallon reservoir situated at 16th and James Streets, 282 feet above city datum; and the high service is supplied from a 20,000,000-gallon reservoir located at the intersection of 34th Street and James Street extended, 426 feet above city datum. A primary impounding basin of 100,000,000-gallons capacity is located on Bear Creek about 12½ miles southeast of the Post Office and 589 feet above city datum.

Supply and Distribution Mains

From the impounding basin a single 18-inch supply conduit extends about 10½ miles to the high service reservoir. The water bureau estimates a continuous flow of 4,000,000 gallons per 24 hours from this conduit. From the high service reservoir there are three distributing mains: A 14-inch pipe used to fill the middle service reservoir, a 12-inch pipe supplying the high service to the west and an 18-inch pipe supplying the high service to the east. From the middle service reservoir an 18-inch main extends down 16th Street to Jerome Street where it branches into a 14-inch main supplying the low service reservoir and a 10-inch main supplying the middle service gridiron system. Ample interconnections were provided between the high and low pressure systems so that the advantage of the large high level reservoir could be realized. Two of these connections were large automatic fire gates. They provided water supply from both sides of the burned area.

Hydrants

Public hydrants supplied from the above described distribution mains were well distributed in the burned area as may be judged by reference to the conflagration diagram on which they are indicated by dots at the street intersections. They were principally supplied by 6-inch mains and the typical spacing was 200 feet between hydrants.

STORY OF THE FIRE

Origin

Shortly after two o'clock on the morning of December 8th, fire was discovered coming from below the floor of a frame pool room situate 532 Commercial Street and also at almost the same time it was discovered in a frame restaurant fifty feet to the east with a large two-story frame department store intervening between them. When the proprietor of the department store arrived, about half an hour after the first alarm, flames were pouring from the windows at either side but had not yet penetrated his store. It is not probable that any more definite information can ever be secured regarding the origin of the fire. Theories of incendiarism, sabotage, careless smoking and restaurant kitchen fire, have each been elaborated in the daily press.

Progress

The Astoria department received the first alarm at 2:12 A. M. At 2:30 the pool room and the restaurant were gutted by the flames. At 2:45 the east end of the block was a roaring inferno and buildings across the street were steaming with the intense radiated heat. They had been dripping wet from a rain that was falling at the time. Before 3:00 A. M. the block was practically consumed, the fire department had been driven from their position on Commercial Street and were "laying in" on Bond Street. A few minutes later burning walls collapsed and carried the fire across Bond Street to the north. Efforts to stop the spread of the fire were by this time becoming frantic. The feverish work of fighting against big odds, and the tremendous exertion of drawing hose in the face of the intense radiated heat was telling on the firemen. It was continually necessary to lay in more hose to reach fresh outbursts of flame or to couple the hose to more remote hydrants.

The hopelessness of the situation was soon evident to competent observers. As the periphery of the burned area rapidly increased the men and equipment became more and more inadequate to cope with the situation. While the fire was being checked at one point it was gaining headway at another. But even as they realized that it was beyond control the refugees continually underestimated the possible extent of the blaze. Household goods and valuable merchandise hastily removed to places of supposed safety were in many instances overtaken by the fire almost before the transfer was complete. Quantities of goods removed from buildings burned in the streets, while other valuables sheltered from the rain in various improvised caches were several times removed to more remote points.

Outside Help

Many persons in the crowd of onlookers conceived the idea of calling on Portland, one hundred miles away, for aid. A newspaper man was the first to put the thought into action. His call was received by the Portland department at 3:25 A.M. A second call from the Mayor reaching the Portland headquarters at 3:32 A. M. inspired them to prompt action. By 7:00 A. M. a special train had been procured and a crew of eight men dispatched on it with 6000 feet of hose, two 1100-gallon per minute steamers and a 750-gallon per minute auto pumper. Unfortunately the apparatus from Portland did not reach Astoria until about 10:00 A. M., but even at that late hour it proved of

great assistance in protecting the hospital, the city hall and the docks near 17th Street, all of which were of frame construction. No difficulty was experienced with the hose threads as both cities used the Pacific Coast standard.

The government dredge Clatsop which was stationed several miles away came to the rescue as soon as possible. The dredge moored to the dock at the foot of 9th Street shortly after daybreak. A long line of hose from her powerful pumps delivered strong streams of water which were the more effective and encouraging since the city hydrants in this vicinity were beginning to fail.

Work of the Fire Department

The Astoria department under the leadership of Chief Foster are deserving of all praise for the splendid effort they made to cope with the situation. The little crew of twenty-two men (twelve regulars) made a losing fight from the start. Moreover, like the spectators, they underestimated the fire in its early stages. Their 1000 g.p.m. auto pumper was left to stand in a side street because ample water was available at the street hydrants. No attempt was made to use it until about an hour and a half after the fire had started and then it was not possible to obtain suction at a point near the fire. The pumper was taken to the public landing at the foot of 14th Street and the suction hose run to the river. After a few hours of intermittent running, an old break on the compression chamber of the pump was reopened. An hour of valuable time was lost while the compression chamber was removed and welded.

No Fire Breaks

Witnesses of the conflagration suggest numerous places where the fire break formed by streets or buildings of relatively good construction might have been made good if men and equipment could have been mobilized there at the strategic moment. Granted that this is the case such conjectures are of slight value since the condition imposed was impossible of fulfillment. No fire breaks existed which could be held with the apparatus available.

Dynamite Used

During the latter stages of the fire large quantities of dynamite were used in a futile attempt to check its progress. The powder was not well placed and in most cases served rather to augment than to check the fire. The only explosives available in the city were twenty per cent stumping powder which was too slow to be effective. It shattered the windows and let the fire in the more easily. By the time automobiles had returned from distant lumber camps with high powered explosives, it was too late for them to be effective.

Where the Fire Stopped

At 1:30 P. M. after eleven and a half hours of fierce burning the fire was under control of the Astoria pumper, three pumpers from Portland and the Government dredge. It had burned out on the sand flats to the east and at the court yards of the Post Office and Court House on the west. On the north the slight fire break afforded by the railroad right of way had been made good by the work of the pumper and the dredge. The successful maintenance of this fire stop can also be largely attributed to the fact that the natural draft of the fire drew cold air from the river rather than from the hillside. On the south the fire was brought under control where it reached solid ground. This is a most significant fact for Astoria to consider and excellent testimony to the fire hazard of "open under" construction.

Control of Water During the Fire

It had long been recognized that collapsing of the viaduct street structures might seriously impair the water supply by breaking off street hydrants and other vertical standpipes or damaging the water mains. To minimize this danger the operating engineer of the water bureau was called promptly and stood in readiness to close such valves as might be necessary to conserve the supply and keep the pressure adequate. As anticipated, the pressure slumped when the streets burned. Control operation was commenced a few minutes after 4 o'clock by closing the valves on 14th Street at Commercial, Duane, and Exchange Streets, in the order named. Proceeding in a clockwise direction about the burned area, the engineer closed the valves in 8th Street at Duane, Commercial and Bond Streets. By this time it was 5 A. M. Returning to Franklin Street, he closed the gates at 11th and at 14th Streets. An hour or so later gates were closed in Commercial Street at 15th and 16th Streets and then one at 17th and Exchange. This completed the closing of the mains in the burned area. It was accomplished at 8:00 A. M.

CONFLAGRATION CONDITIONS

Inferior Construction

Analysis of the situation arouses surprise; not that the fire occurred but that it did not occur sooner. In a colloquial phrase, the city was "built to burn" and upon its inferior construction may be placed the responsibility of the conflagration proportions attained by this fire. The business district comprised block after block of congested frame buildings supported on timber structures and connected by wooden streets which formed a network of intercommunicating galleries.

Reference to the cross section diagram of a typical street illustrates at once the splendid medium they afforded for supplying air to the blaze and encouraging its spread. The tile fire walls shown did not cross the streets but merely encircled each block. The construction was too light to form a fire stop in the true sense and moreover, numerous unprotected openings are reported to have been allowed as exits from basements.

Effect on the Fire

In its early stages fire did not spread under these viaducts. They served rather as draft openings supplying air to the fire so advantageously that the intense radiated heat caused flames to break out across the fifty foot streets. It was only a relatively short time, however, until the creosoted timber below the streets took fire and flames were swept through the sub-surface tunnels to break out on the surface

at remote points. The melting asphalt on the planks above added fuel and created a dense choking smoke.

Weather Favorable

Weather conditions were apparently favorable to the fire fighters. There was practically no wind. In most cases noticeable drafts were caused by the fire itself. Light snow and rain fell in intermittent showers throughout the night. Despite many large brands carried considerable distances by the ascending air currents, no spread of the fire was reported from this cause. A glance at the diagram shows that the fire spread about equally in all directions. It is highly probable that if a strong wind had been blowing to carry the fire in any one direction the loss would have been much less.

Individual Protection

Practically none even of the better buildings had any private protection. The necessity of providing wired glass windows or fire shutters on exterior wall openings in masonry buildings is one of the lessons of the fire. The Spexarth building (a four-story reinforced concrete structure with composition roof) situated at the northeast corner of 8th and Commercial Streets has become conspicuous, since its concrete walls and floors withstood the heat. If standard window protection had been provided on this building the heavy damage to interior trim and finish could have been largely avoided. This was the only building of such construction in the burned area. Buildings of ordinary joisted construction with brick or concrete exterior walls such as the Astoria National Bank, the Weinhard Hotel, the Astoria Savings Bank, the Elks Club and others of similar construction, became an easy prey to the fire when the flames entered through the windows. Whether or not window protection could have saved them is of course problematical but it seems probable, since the department could then have concentrated its attention on the roofs.

Adequate Water Supply

Water for use at the fire was drawn from the high level reservoirs previously described. During the first two hours of the fire, hose streams from street hydrants were quite satisfactory. Pressure in the mains is estimated at about 90 pounds with all fire streams in action. The streams were not effective because the water did not reach the seat of the fire but the pressure and flowing capacity of the mains were adequate for the equipment available. After the first two hours the street hydrants and other vertical standpipes began to break under the weight of the collapsing streets and falling debris.

Fortunately the system of street mains was well equipped with control valves and officials of the water bureau were prompt to shut off sections in which it was found impossible to maintain the pressure. During the course of the fire the water level in the huge reservoirs fell only a relatively small amount. Officials of the water department estimate the consumption at 5,000,000 gallons during the entire eleven hours.

THE BURNED AREA

To anyone acquainted with Astoria, it is ample to say "the business district burned." It was a level area, 32 acres in extent, 90% light frame construction, and practically without exception supported on piling. The relative position and the extent of the burned area are indicated on the accompanying diagram. It will be understood that the shaded section indicates blocks actually burned. However, many buildings situated in adjoining blocks were damaged by smoke and water. A more comprehensive idea of what was burned may be obtained by using the accompanying diagram of the burned area as reference to the Sanborn Map which had been corrected to May 19, 1921.

In reference to important buildings standing about the rim of the fire, it may be said without exception that they suffered broken windows, smoke and water damage. Buildings thus affected are the City Hall in block 520, St. Mary's Hospital in block 519, Lovell's Garage in block 518, Y. M. C. A. building in block 67, Telephone Exchange in block 65, Creamery building in block 26, the Spexarth building in block 24, and tile constructed building in block 9.

LESSONS OF THE FIRE

Repetition of the Lessons from Preceding Conflagrations

Favorable climatic conditions and good fire record are no guarantee of safety and should have slight consideration in estimating fire protection.

A fire department cannot control a fire in a large congested area in which the fire can spread more rapidly than the department can get into effective operation.

The protection of exterior wall openings is an absolutely essential factor in preserving the integrity of the fire break formed by masonry buildings.

"Open under" construction without adequate fire stops is a conflagration hazard of the greatest magnitude.